Acceptance of energy transitions and policies: Public conceptualisations of energy as a need and basic right in the United Kingdom

Christina Demski[1,2], Gareth Thomas[1], Sarah Becker[1], Darrick Evensen[1], Nick Pidgeon[1]

[1]Understanding Risk research group, School of Psychology, Cardiff University, Cardiff, CF103AT, UK

[2] Corresponding author: DemskiCC@cardiff.ac.uk; +44(0)2920 876020

Abstract

Energy, and its use in society, can be understood and conceptualised in multiple different ways, emphasizing different sets of values and attributes. In this paper, we examine how members of the public conceptualise energy, showing that a particularly salient frame is one of energy as a need and basic right. To orient our analysis we use the concept of framing, as rooted in sociological and psychological literature on framing effects and decision-making. The qualitative analysis draws from two UK datasets. The first consists of five focus groups (n= 37) examining public perceptions of energy transitions. The second dataset consists of four deliberative workshops (n = 46) exploring public perceptions of energy storage. We find that energy is explicitly discussed as a basic need because of its perceived role in ensuring survival, good health and a decent life. This is particularly salient when considering the wellbeing of vulnerable groups. We suggests that 'energy as a need' provides a framework for people's evaluation of proposed changes to the wider energy system including how energy is produced, consumed and governed, and discuss implications for policy and practitioners that seek to ensure low-carbon energy transitions are successful, inclusive and socially acceptable.

Keywords

public perception; energy needs; energy justice; energy transitions

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1 Introduction

Energy plays a critical role in societal and individual wellbeing, nonetheless we face significant challenges (e.g. climate change, fuel poverty, resource scarcity) that necessitate major changes to how energy is produced, consumed and governed in many countries. While the success of energy transitions aimed at addressing these challenges is dependent on numerous factors, public acceptance is certainly one. Consequently, an array of research examines perceptions and acceptance of supply and demand-side technologies at various scales, as well as practices and everyday behaviours [1,2]. In this paper, rather than focusing on public perceptions of a specific energy technology or of a particular form of energy use, we examine the broad frameworks in which energy is understood by the public and how this contrasts with other perspectives. While we have a UK focus, we argue that this approach is also applicable in other contexts especially those in which energy provision has been privatised.

We suggest that a particular salient public frame through which energy is understood is one of energy as a need and basic right. We draw out implications for public acceptance issues and energy policy more generally, stipulating that 'energy as a need' is a frame in which changes involving energy provision, consumption and governance will be understood and evaluated. Technologies, policies or changes that threaten or do not account for this frame are unlikely to be evaluated favourably. This analysis and conclusion is embedded in the notion that energy has multiple socially constructed meanings which compete for attention [3].

1.1 Framing energy as a basic need

While energy might have specific meanings within scientific and engineering contexts (for example see [4]), the way energy is understood in society is more diverse. Indeed, it could be said that there is no single socially shared understanding of energy and its role in society but instead energy is conceptualised and framed in different ways across different domains or groups within society, each emphasising different values. For example Stern and Aronson (1984) pose that energy can be viewed as a commercial commodity, as an ecological resource, as a social necessity or as a strategic material.

Different conceptualisations can, of course, exist in parallel, but differing or even divergent framings of energy make it difficult to have socially shared ways of dealing with 'energy problems' (e.g. climate change, fuel poverty, energy security etc.) and finding solutions that address a wide set of values [5,6]. In this context, it is particularly important to engage with the plural meanings of energy to find acceptable and effective energy transition pathways [7]. This has implications for national energy policies, the key vehicle through which large-scale changes to the energy system are introduced and managed. Indeed a host of literature critically examines energy policy itself in terms of the framings and values that are embedded within it [8,9].

The concept of framing, as evoked in this literature, is rooted in sociological and psychological literature on framing effects in decision-making and communication [10–12]. It refers to the way policy is created around a set of assumptions and constructions about an issue that emphasise and link issues in certain ways and thus affect interpretation of a particular issue and its solutions. As such, frames serve the function of organising relevant information and beliefs, helping people make sense of an issue and acting as an interpretive lens. A particular frame might focus attention on particular problem definitions, considerations and solutions [10,11]. With regards to energy policy, there has been increasing academic focus on the need to examine the 'services' that energy provides, rather than thinking of energy purely in terms of commercial units of fuel or electricity[13]. In relation to this, the emergent energy justice scholarship has focused, in part, on access to these energy services. It is argued that being able to use energy services is often essential for securing basic needs and engaging in expected patterns of life. If people are denied such access, this may have serious consequences for physical and mental health as well as wider well-being [14,15], which is also discussed extensively in the literature on fuel poverty and vulnerability [16]. Furthermore, authors have argued that energy services could provide the basis for basic human rights claims. Such rights claims may be related to various issues including sufficiency (enough energy to maintain basic health and survival needs) or equity – enough energy to engage in those practices associated with having a decent life relative to the society in which one lives (enough to permit children to do homework or watch TV on a dark evening) [17]. Similar distinctions can be found elsewhere in public policy discourse, such as those often made between absolute and relative poverty. Reflecting not only competing policy prescriptions but also the wider discourses that mobilise popular support for them [18], both absolute and relativist conceptions assume that in a civilised society there is some level of welfare below which members should not be allowed to fall.

The framing of energy as a basic right on account of underlying health and economic advancement for people is something that existing energy policies often do not take account of sufficiently (e.g. [19,20]). In addition, the increased marketization of energy and the delivery of energy policy through market measures in the UK (but also elsewhere, e.g. [21]) has been called into question especially in terms of addressing energy justice concerns. While much of this discussion is around distributional components of energy justice (i.e. equal access to reliable and affordable energy services), the importance of procedural and recognition justice has also gained attention [16]. This is particularly relevant in the context of energy transitions where policies to decarbonise the energy system might raise additional justice concerns, for example by placing unfair burdens on vulnerable groups (i.e. not recognising their needs and circumstances) through new technologies and requirements, for example smart energy systems [22], or financing energy transitions through regressive levies on energy bills [23,24]. Similarly, certain groups, particularly households in fuel poverty, may lack the ability and time to participate in energy policy decision-making or accessing

opportunities such as energy efficiency programmes that are designed to ensure energy needs are met [25].

These more general concerns about energy justice have also been raised more specifically in relation to UK policy. While the UK has been in the vanguard of both energy market liberalisation and climate change legislation, it has been less successful in terms of energy affordability [26]. Indeed, from 2004 to 2012 household electricity and gas prices have increased by over 75 and 122 per cent respectively [26]. This is particularly concerning trend for those on low incomes and/or dependent on welfare, especially in light of recent cuts to social security benefits [9]. Fuel poverty has therefore become an ever-increasing concern, which has been addressed in arguably limited ways. For example, existing programmes that are designed to help people meet their energy needs have focused heavily on older people[1] and heating needs (e.g. through the Winter Fuel Payment[2] or Cold Weather Payment[3]) with very limited ability to account for the needs of other groups (e.g. disabled) and other types of energy needs (e.g. light, communication, mobility) [9,17]. Similarly, while some programmes to improve the poorly insulate UK housing stock, such as the Warm Front Program[4], have been successful (e.g. in terms of satisfaction and uptake levels), they have also had inadequate reach in the context of rising energy prices and resulting rising levels of fuel poverty [27]. The UK regulator Ofgem expects that an increasing number of people are at risk of fuel poverty if energy bills do not fall in real terms and there is continued slow wage growth [28].

1.2 Public conceptualisations/framings of energy

The discussions on energy policy and energy justice provide the context in which our current analysis should be considered. However, we do not make claims about how energy policy should be framed but rather what implications public understandings and framings of energy have for the communication of, and engagement with, energy policy. Because energy can take on multiple meanings and be framed in different ways, it is prudent to understand how these frames are used, and in particular who is using them. This is not to say that different frames, e.g. energy as a necessity or energy as a commodity, are mutually exclusive, but that they emphasise different values and aspects. If a particular frame that is used by one group does not resonate or is even rejected by another group,

[1] We note, however, that the recent Affordable Warmth Obligation (as part of the Energy Companies Obligation) is an exception to this. Under this scheme, energy companies are legally required to improve energy efficiency of households of those on low incomes or on certain social security benefits, for example through new boilers and insulation.
[2] The Winter Fuel Payment is a non means tested, tax-except, payment (£100-300) provided to all UK citizens older than 63 or in receipt of a State pension or other social security benefit.
[3] The Cold Weather Payment a payment (£25 per affected week) given to those in receipt of certain benefits if the average temperature in their area is recorded as, or expected to be, zero degrees Celsius or below for 7 consecutive days.
[4] The Warm Front Program (2000-2013) provided grants to householders for insulating houses and improving heating measures. See Sovacool (2015) for further details.

this might be problematic for cooperation. With this in mind we examine public conceptualisations of energy and examine how certain frames, or interpretive lenses, are used to understand and make sense of energy issues and the role energy play in society. This in turn is important for policies that seek to communicate and engage people with these policies, for example actively by encouraging uptake of technologies and programmes, or passively by ensuring opposition does not ensue. As such, we seek to further literature on public perception and acceptance of energy transitions including on the various changes and related processes that are inherent in transitioning. We argue that analysing the frames salient to the public when discussing energy issues is an important tool for understanding public responses and engagement with energy.

In particular, we posit that a particular salient way of thinking about energy, among the UK public, is that of energy as a need and basic right. As such, we expect public framings of energy to align closely with the framing delineated in the energy justice literature. This is also in line with prior empirical research on public perceptions of energy transitions, which has examined aspects of people's relationship with energy. For example, we find that people believe energy will and should be made accessible and affordable for all [5,29], thereby asserting the importance of justice and fairness within energy systems. Public perceptions research on energy system change has also argued that existing UK energy policy is unable to fully account for the broad set of concerns people bring to bear on the process of energy transitions. Similar to the energy justice literature, the argument is made that policy framings are too narrow to effectively engage with the ways people perceive and construct energy transitions [6]. Specifically, much of UK policy is constructed and communicated in terms of addressing climate change, energy security and cost effectiveness, whereas values such as social justice, fairness and autonomy are much less discussed or explicitly addressed. A similar argument was originally put forward by Stern and Aronson (1984), who suggested that members of the public tend to invoke a public good framing of energy (e.g. something necessary to live a healthy life), whereas policies put forward by governments, especially in the US and UK, tend to have an underlying framing of energy as a commodity. To examine this claim in more detail, we focus specifically on public understanding of energy as a need or basic right but also examine ways in which public views deviate from this.

Conceptually, frames represent socially constructed and shared meanings about an issue [30], and while they are not static, they should be relatively stable across contexts and time, although this is likely to depend on the extent to which a particular frame has become salient in public discourse. Frames might also be more or less salient in society or within particular groups in society [3]. We therefore posit that public conceptualisations of 'energy as a need' are likely to be one of the more salient frames that people use to evaluate and examine energy issues and policy. That is not to say that we expect members of the public to be unaware of other frames to conceptualise energy in a certain way (e.g. by other groups in society), or that it is the only frame used by individuals, but simply that

the ‘energy as a need’ frame is widely shared and thus important for guiding people’s evaluations of energy issues. Of interest are therefore not only whether the framing of energy as a need is evident in people’s discussions but also how it manifests and emerges. We would also expect people’s views on energy, and its place in society, to be nuanced and multiple with substantial ambiguity across contexts and individuals. For example, people might view particular aspects of energy as necessities (public goods), but other aspects as luxuries (e.g. particular uses of these resources, wasteful behaviour; [19,31]).

We draw our analysis from two datasets. The first is derived from focus groups as part of a wider UK Energy Research Centre (UKERC) project examining public perceptions of costs associated with energy transitions (Project A). The second dataset is derived from deliberative workshops conducted as part of the public perception work of the Realising Energy Storage Technologies in Low-carbon Energy Systems (RESTLESS) consortium (Project B). These two datasets, while different in specific focus and methodological detail, both engage members of the public with the topic of energy and energy transitions through a series of discussions and activities; both projects did not explicitly frame energy as a need (further details in section 2). These projects provide an opportunity to examine people’s intuitive conceptualisations and understandings of energy across different qualitative research contexts.

2 Methods

2.1 PROJECT A focus groups - Sample and location

The [PROJECT A] focus groups were designed to gain in-depth understanding of people’s thoughts and reasoning on costs and responsibilities associated with energy transitions. Five focus groups were held in four locations throughout the UK – Cardiff in Wales, London (x2) and Birmingham in England, and Glasgow in Scotland. They were conducted in November/December 2016 and each focus group lasted approximately 2.5 hours. Six to nine participants were recruited for each group, ensuring a diverse range of demographic characteristics (*e.g.* gender, age, income). The demographic make-up of the sample of each focus group is summarised in Table A.1.

Participants were primarily recruited using demographic and contact data volunteered by those that took part in the initial survey stages of the project. Following a lower than expected response rate during initial recruitment (3 in Cardiff; 14 in London; 5 in Birmingham; and 3 in Glasgow), the remainder of the sample (12 people) was recruited with the aid of an external recruitment company. Participants were paid £60 for their time.

2.2 PROJECT A focus groups - Protocol and materials

The key objective for the focus groups was to elicit public perceptions, values, meanings and emotions about the costs that might be associated with energy transitions. The first part of the focus group invited participants to discuss how important they felt each of the following goals were: reducing fossil fuels and increasing low-carbon energy sources, reducing overall energy use, the need for a reliable supply of energy that is continuously available, and ensuring affordable energy and helping those who cannot afford energy (e.g. disadvantaged groups). The second part then introduced the idea of costs within energy transitions (if not already brought up by participants themselves). Participants were invited to discuss how we, as a country, might pay for these and who has responsibility to pay for achieving the previously discussed energy transition goals. Participants were prompted to discuss their views on the UK government, energy companies, and the UK public and future residents. The final part of the focus group was designed to explore people's perceptions and responses to individual level cost associated with energy transitions.

2.3 PROJECT B deliberative workshops - Sample and locations

The public perception component of PROJECT B aims to enhance our knowledge of how members of the public perceive a range of technologies for storing electricity in the home, communities and on the national grid. We conducted a series of deliberative workshops with members of the public, exploring the future of energy storage and consumption, and the different implications new business models may have for everyday life. The four deliberative workshops were held in three locations across the UK – Birmingham (x2) in England, Abergavenny in Wales, and Aberdeen in Scotland. The workshops were held between July 2017 and October 2017. Participants were recruited topic- blind using a professional recruitment organisation. Each workshop lasted approximately 7 to 8 hours each. Participants were paid £100 for their time.

The sampling aim was to recruit participants who represent a diverse set of perspectives. Therefore we recruited groups with people of diverse socio-economic position, age, gender and ethnicity. This was achieved as evident in Table A.2 summarising the sample profiles for each workshop. Thus our aim was to recruit participants that represent a wide and diverse range of experiences and backgrounds. In addition to sampling a diverse range of participants across basic demographic variables, we also judged housing tenure and location to be important shared experiences for contextualising people's views on energy storage technologies [32]. Therefore, we sampled the two Birmingham groups either to include suburban homeowners or to include urban tenants of rented accommodation. Abergavenny represents rural residents, and a number of people who are not connected to the main gas grid in the UK. Aberdeen represents a mixture of urban homeowners and those in rented accommodation.

2.4 PROJECT B deliberative workshops - Protocol and materials

The key objective of the deliberative workshops was to provide an opportunity for members of the public to debate and discuss the issues and questions that interest, excite or concern them about a particular topic; in this case energy storage technologies and their role in future energy systems. We developed a protocol generic across all workshops including a number of carefully constructed and balanced supporting materials. All materials were produced in discussion with engineers and energy systems experts with the aim of providing accurate and balanced information about energy storage to members of the public with little specialist knowledge of energy issues. We were careful to create spaces in which our participants were able to react to and query the information provided.

After welcoming participants and obtaining consent, we asked participants to engage in a doodle task. Participants were asked to draw how they think the energy we use reaches us. Second, the researcher gave a 20 minute PowerPoint presentation introducing the rationale for energy system change (including climate change, ensuring reliable supplies, affordability and renewal of infrastructure) and the topic of energy storage. This presentation was followed by a whole-group discussion.

After a break, participants were split into two smaller groups to facilitate more in-depth discussion on different energy storage technologies including their risks, benefits and potential applications. These included large-scale energy storage technologies such as hydroelectric power and compressed air as well as smaller scale options such as batteries in homes. Alternatives to energy storage were also presented in the form of interconnection, continued and expanded use of gas power stations, and demand-side response. After lunch, participants, still split into two smaller groups, were asked to read six posters describing different ways of managing relationships between energy users, producers and storage technology providers.

The final small group task involved three short scenarios or storylines illustrating how energy storage may impact on a person's life and local environment. Participants read each scenario, which was then followed by a group discussion. The day ended with a plenary discussion including feedback from each group, reflections and then a debriefing session by the facilitators. All materials used are available on the PROJECT B website (http://www.restless.org.uk/) or available from the authors.

2.5 Data Analysis

All discussions were audio-recorded and transcribed professionally, checked against recordings to ensure accuracy, and then anonymised. All names are reported as pseudonyms.

The analysis contains both top-down and bottom-up elements. Through analysis of both datasets for other purposes (e.g. to examine how people evaluate energy storage technologies),

'energy as a need' emerged as a relevant theme from both datasets. Having established that our participants appear to use this way of thinking about energy to guide much of their discussions, we analysed this in a more systematic manner. Therefore further analysis was guided by the previously outlined conceptual framework and empirical research (see introduction). Thus, our analytic approach addresses how people's discussion of energy across multiple contexts is guided by their intuitive conceptualisations of energy as a need and basic right; we further examined how this manifests and how this relates to people's thoughts on other relevant issues (e.g. what is acceptable and unacceptable with regards to how energy is produced, governed, and consumed). We were also careful to look for counter examples and instances where energy was not necessarily conceptualised as a need (e.g. through aspects that were considered luxuries by some participants).

We first identified all passages across both datasets that may contribute towards our analysis. Data extracts were independently coded by CD (lead author) across both datasets, and additionally by co-authors SB for the UKERC focus groups and GT for the RESTLESS workshops. We then examined the relevant data extracts in more detail to draw out more nuanced themes. This process followed established guidelines for qualitative data analysis [33] and was inherently iterative and involved reading and coding both datasets repeatedly, and discussing emerging themes with the research team.

Illustrative quotations are included in the text and accompanying tables per theme and supplemented by additional tables with quotations in the appendices.

3 Findings

3.1 Energy as a need and basic right

Throughout our dataset we find discussions in which participants explicitly refer to energy as a need, or in the words of Thomas from Cardiff (Project A), "a necessity". When doing so, participants consistently compared it to other essential needs such as food, water, shelter and safety as the quotes in Table 1 illustrate (also see Table A.3). Arguing that energy affords services that everyone needs to survive, some participants also referred to it as a right, for example Adam (London1, Project A) summarises his views by stating: "It's the right to have a supply of essential resources like energy." This echoes the energy justice literature, which calls for energy to be seen as a basic need and right on the basis of sufficiency.

Discussions of energy as a need were particularly salient during instances where the perspectives of vulnerable groups such as the elderly, disabled or those otherwise disadvantaged were considered; this was a recurring theme throughout our datasets. While participants in Project A were prompted to discuss their perceived importance of affordable energy and ensuring vulnerable groups have access to energy, this also emerged spontaneously in the discussions of our Project B

participants. In both groups, it was considered particularly unacceptable for people to have to compromise their health because they are not able to heat their houses (e.g. because of high energy prices). In addition, trade-offs between basic needs such as food or heating were seen as unacceptable in today's society. Here we can already see that the notion of choice is an important determinant in judging whether energy is something that is needed or not. If people need energy in a given context, they do not have a choice but to use it. As Caroline (Cardiff, Project A) says: "I think we are talking about people who […] haven't got the option to put their heating on." If energy is needed for survival, health or safety, then energy is likely to be viewed as an essential need that should be guaranteed because people have no choice but to use it. A similar notion can be seen in the interchange between Simon and Lewis in Table 1; here they discuss the idea that some people are at home during the daytime and therefore need to use more heating than people who are not. In this sense, these people are not seen to have a choice but to use the heating (because it is considered unacceptable not to have a decently heated home). Similarly, Amy (Birmingham homeowners, Project B) points out that some people have needs that are not changeable such as "disabled people on dialysis machines, and…things that they have, you know, and these oxygen things that they need to use during the day time." Some of these aspects became particularly salient when discussing future changes to the energy system that might compromise people's ability to use energy as much as they need and when they need it; for example through introducing time-of-use pricing which may result in high prices during peak times rendering energy unaffordable for some groups in society if they are not able to shift their demand. As such, our participants also raised issues in line with notions of recognition justice, highlighting the need of diverse, and often vulnerable, groups and questioning to what extent these had been accounted for in potential future policies [17].

Energy, through the services it provides, was considered, to some extent, essential for everyone - not just vulnerable groups. The notion of choice is again important here, for example, it was considered that everyone needs heating to ensure good health. While there are of course nuances as to how much everyone needs heating (e.g. heating a large house to 25 degrees versus one room to 18 degrees), the fact that everyone needs some heating was clear for our participants. As the quotation from Lisa (Abergavenny, Project B) illustrates, while you can try and put off turning on the heating at some point you have to use it or otherwise compromise your health:

> "[…] my mum, every year she's like "I'm not turning the boiler on, I'm not turning the boiler on" and it gets to November and she's freezing cold and then she's like "Right, it's time to turn the boiler on". She won't do it until she absolutely has to."

Similarly, our participants also discussed individual needs that may require more or less energy, a level that is not necessarily something people choose but is dictated by other factors, such as looking after grandchildren during the day or running a farm (see Table 1). Compromising people's

health or ability to carry out their role in society by limiting access to energy (e.g. through high costs) was considered unacceptable, and it could also be argued that energy was seen as a right in this regard. Again participants often invoked energy as a need when discussing possible future changes that would potentially threaten people's access to energy when they are perceived to have no choice but to use it. These threats are viewed to come from various changes such as high cost or other changes that limit access such as smart systems that require shifting demand according to price or other signals. Participants looked for reassurance that changes would not compromise people's access to energy when they needed it for essential services.

Table 1. Energy as a need and basic right – illustrative quotations.

Participant(s)	Quotation
Energy as a need and basic right – general	
Thomas, Cardiff (Project A)	Well, it's the basic things in life I guess, isn't it? You need shelter and electricity, water.
Freddie & Lewis London1(Project A)	F: Yeah, but part of it you shouldn't be in a situation where they can't heat their homes, should they? Nobody…in this day and age, in this country, nobody should not be able to afford to heat their homes. L: And the people shouldn't, in that respect then, have to go to foodbanks either.
Lukas, London2 (Project A)	That's right, because everybody needs to use energy, right, it's not like 'I'll be the only household, I don't need any energy.' It's a basic human right and you need that to survive and live.
Lukas, London2 (Project A)	Energy is one of those things which shouldn't be privatised, one of the things – everybody needs to use it, it's an essential everyday thing that should be government-owned, government run or not-for-profit, it should be a not-for-profit organisation.
Henry, Birmingham homeowners (Project B)	At the moment, and I had something from the National Grid come out yesterday, um, to change my gas meter, and we had a discussion about these Smart Meters and, … I mean, they were supposed to come in 2010… it's taken a while… not quite there yet…, but for me I've only had it for a few weeks, and already it's… it's irritating me, because I'm seeing the energy that I'm using, and I have no choice about, and they're things that I need.
Energy as a need and basic right – vulnerable groups and individual needs	
Lindsay, Cardiff (Project A)	I definitely agree with helping those who can't afford to pay for the energy themselves because you hear about elderly people living in their houses with no electricity or gas turned on because they can't afford to pay for it, because they're living off their pension. Then, obviously it's not enough to pay for how much gas and electric costs these days because it's a lot of money.
Simon & Lewis , London1 (Project A)	S: On the earlier points, about all the different things with having a house. So you get people like Lewis who's perhaps at home will make more use or need to make more use of energy whilst he's at home. I work part time. The days I'm out, the heating shut itself down at 7:00 and doesn't come on until 5:00. In the winter if I'm in all day, unless I put my coat on, I've got to run the heating. So the people that are then disadvantaged are using more energy but they're also the ones that can't afford… L: And it's not through choice. S:…to use the energy. You also get some of these single parents, perhaps disadvantaged.

Hannah, Birmingham (Project A)	Because you can very well spend less than 10% if you're not heating your house and not cooking with fuel, if you don't – there are pensioners who actually don't put the heating on because they are frightened that the bill is too high. They don't cook their meals because they are frightened that their energy bill is too high and they end up sitting in a little room with very little….heat.
Jessica Birmingham tenants (Project B)	Well, some people have got more needs than other people. Some people might have medical needs where they need a higher electrical current, they might have ventilators and stuff. So how do the aggregators distinguish between people with greater needs or not? So I'll worry about vulnerable people in that instance.
Jessica, Birmingham tenants (Project B)	[talking about smart technology] So if they came in and did like an audit of your home and said, well, okay, go out to work at this time, because we're going to shut down all these appliances in these hours and then get them started up again in time for you to come home, if they could do that or you could just program that yourself, then that sounds a great idea in exchange for cheaper bills. But again, I would still worry about those in the population that would need, you know, a daily supply because they've got—they need to be at home. So it would have to be a balancing act.
Sheryl Abergavenny (Project B)	Diesel for your tractors, it doesn't matter what it costs, you've got to have it to do that job.

3.2 Individual and societal dependence on energy

Much of the concern around fair access to energy services arose around high energy prices potentially limiting people's ability to cover their energy needs adequately. In the UK context, affordable energy is therefore a particularly salient concern [29,34], with other threats to access being less salient, for example issues around physical connections to the grid or unreliable energy provision. However, our participant discussions did also contain instances where people considered occurrences where energy was not physically available, most commonly through power cuts (or running out of energy more broadly). In this regard, power cuts appeared to serve the function of revealing individual and societal dependency on energy, and by extension they reveal the essential nature of energy in modern life such as for heating, cooking, washing, entertainment and so on (Table 2 and Table A.4). As such, disruptions to reliable energy services provide a more implicit way in which 'energy as a need' emerged in the discussion.

The recollection of past power cuts, or consideration of possible future power cuts, evoked ambivalent feelings within our sample, however. On the one hand, the majority of people in urban areas have very little experience with power cuts and if they do these are infrequent, rare and short-lived. Therefore people generally view them as more of a nuisance and annoyance in contrast to the more serious threat of not being able to buy energy, which some people are perceived to face. For example, Val (Aberdeen, project B) notes "it always happens when I was in the shower, which was frustrating when you've shampoo in your hair" (Table 2 for further examples). On the other hand, participants also repeatedly thought about the potentially severe consequences power cuts could have, suggesting outrage, panic and societal breakdown as possible negative impacts. While our participants did not seem overly concerned about the likelihood of severe power cuts (e.g. those that last long or

are frequent), the underlying assumption seemed to be that energy is critical to individual and societal well-being in the UK, and that blackouts cannot be allowed to happen. The dependency on energy therefore could be said to make it, in the eyes of our participants, a basic right that should be guaranteed to people (e.g. by the state). Currently, however, people do not seem overly concerned about detrimental loss of electricity occurring. This is not to say that our participants were not concerned about loss of power in the future, but simply considered this unacceptable in the context of individual and societal need for energy.

Table 2. Power cuts and individual and societal dependence on energy – illustrative quotations

Participant(s)	Quotation
Nathan, Glasgow (Project A)	Well it's a worry because you come to rely on so many other countries, I remember there was a time – it wasn't energy but it was oil, and you see how quickly things came to a standstill, things you wouldn't normally associate with oil affecting how you get bread and milk and your messages and things like that, how quickly things came to a standstill so that's a worry that having a reliable source and if it continues to be available where is it going to come from in the future, that's a worry.
Lisa, Abergavenny (Project B)	And using it when it's really high. Yeah, it would probably balance out to about the same anyway. So most people wouldn't probably bat an eyelid. Unless it just went—and then everyone would freak out.
Jack, Abergavenny (Project B)	[a powercut would] shut the country down.
Lesley, Aberdeen (Project B)	It's (energy) really important because we cannot function without it.
Chloe & Amy & Lisa, Abergavenny (Project B)	Chloe: We had thunder, or something. I think it makes you realise obviously how important and essential it is, because how many people go to – the electric's gone off and like the lights- Amy: It makes you realise what is… Lisa: You'll go, I'll make a cup of tea. Ah! Chloe: Let's go and make a cup of tea, oh, kettle's off. Amy: yeah. Lisa: Make some dinner – oh no- Chloe: You just keep like saying oh God, can't use that, can't use that, can't use that.
Lisa, Abergavenny (Project B)	A power cut like—you don't really get the power cuts in Abergavenny, like in the town. I've only had—I've lived in Abergavenny my whole life, I've only had two power cuts, I think, and they've only lasted a couple of hours, it's no big deal. It comes back on, you get on with it, it's fine.

3.3 From energy as a need to energy as a luxury

While it was relatively clear from participants' discussions that energy was considered needed to guarantee healthy living (and in some cases survival), energy was also seen to be needed for other activities that were seen to be part of a decent and modern life (Table 3 and TableA.5). In this respect however, the notion of choice and the difference between need (having no choice) and luxury (having a choice) was less clearly defined. Participants found it difficult to say when energy stopped being a need and became a luxury instead. There was a sense that this required careful thought and

deliberation. Nonetheless, energy was still, to some extent, seen as a need, arising out of the observation that people (and society) had become reliant on and accustomed to a reliable energy supply.

Due to this reliance, participants often questioned whether it would be practical, or fair, to change this guarantee of reliable and constant energy we now have. This type of discussion also included comparisons to the past, where our participants acknowledged changing standards by discussing what used to be a luxury, no longer being so (see Table 3 and Table A.5). While for some this shows that energy is needed beyond basic survival to have a decent life (e.g. it is not acceptable to be expected to share bath water anymore), but for some there was also a perception that perhaps things had gone too far. This was seen to manifest in perceived wasteful and taken-for-granted behaviours, echoing earlier research, which has found waste to be an important theme in public discourse around energy [5,35].

Our participants perceived wasteful behaviour to signal opportunities to reduce energy use, something seen as desirable and necessary in the future. However, the discussion of policies designed to encourage reduction in energy use also brought the needs framing to the forefront again, particularly when participants considered to what extent their energy use could be reduced further. Our participants perceived a limit to the idea of energy use reduction, questioning the extent to which energy saving can be asked of people in the context of having a right to lead a healthy and decent life. For example, unsure as to where to draw the line between need and luxury, Jake (London2, Project A) considers: "once you reduce power right down…you'd have no mobile phones, hardly any television…mind you, would that be a bad thing, if we went back to an agrarian society though?"

In addition, for a few of our participants, 'energy as a need (and right)' did not appear to be a particularly salient frame, and instead they appeared to discuss energy more in terms of what they 'wanted' and what they were unwilling to give up. This included acknowledgements that they wanted to have access to energy as much as they liked, and critically, whenever they liked. These participants were not particularly concerned about safeguarding what they perceived to be their personal needs (and possible associated rights) but rather that they were unwilling to support changes that might jeopardise their reliable and abundant energy access. This way of discussing energy access was particularly evoked when the Project B workshops presented future scenarios in which demand shifting was considered a viable future option, prompting several of our participants to explicitly state that they would not like such a scenario. This was particularly important to Glynis (Birmingham tenants, Project B) who explained several times that constant access to energy services such as heating, washing and using electronic devices is something she was not willing to give up (also see quotation from Ken in Table 3):

> Yeah, because it's – once the heat's gone, it's gone. And I want to be able to feel free that I can have the heating on whenever.
> […]
> Because I want to have my electric—I want it when I want it
> […]
> I want to have a shower or a bath at whatever time I want to.

Such explicit acknowledgment of wanting access to energy in a non-restricted manner was however rarer. Considerations of how one could change or reduce energy use without compromising the specific needs people had for energy, was a more salient frame (see previous sections).

Table 3. From energy as a need to energy as a luxury – illustrative quotations

Participant(s)	Quotation
John, London1 (Project A)	You asked a general question, can we reduce electricity use? In some senses we can, other senses we can't. Because we are introducing more and more technology which requires electricity. We brush our teeth with electric brushes, we shave with electric shavers, we clean our carpets and houses with electric. Do you understand? So electricity is used in everything.
Sheryl, Abergavenny (Project B)	So unless you haven't had the system renewed, but I mean, as Lisa said, you've got to have one bath and that's it for the next probably four or five hours. You know, and we all don't want to jump into somebody else's bathwater. That's what you had to do years ago.[…] I mean, 30, 40 years ago it was absolutely brilliant to have hot water coming out of a tap.[…] You know, but I think we have moved on.
Joanna, London2 (Project A)	Well he already said it before but definitely it's important but we are so addicted to technology and things that use energy and we can reduce up to a certain amount and even if we can reduce it the best that we can, which is hard – it's mainly to educate people and change the mind that we have got – consuming energy, it's only until a certain limit that we can reduce it because we will need energy.
David, Cardiff (Project A)	Because we're using too much energy as that lady said, people just switch on a light, do this, do that. They don't think about what they're doing.
Ken, Birmingham homeowners (Project B)	Me, for the… when you've got to do things just to get power; you don't want to be messing around. You just want constant power.

3.4 Energy as a commodity

There were a few instances in which certain participants clearly evoked a commodity framing of energy; this was often in relation to what participants might consider 'luxury' energy use (or energy use where people were perceived to have a choice). In addition, the commodity framing was salient when participants discussed perceived taken-for granted-energy use and energy wasting. In these instances our participants considered energy too cheap and thought this was the reason as to why people do not use it carefully. Wasting energy was directly linked to the monetary value of energy as both Amanda and Andy explain (also see Table 4):

> It's becoming a commodity I think, that people don't value. They might know when they get their electric bill but they don't actually do much about it. I go around switching microwaves off at the mains and my husband says, 'Oh for goodness sake, that's probably costing about a penny a day[...]. (Amanda, Birmingham, Project A)

> The other thing I think energy is too cheap. We don't need all these lights on. If it was too expensive, we wouldn't have them on. It's as simple as that. People waste a lot of energy. (Andy, Abergavenny, Project B)

A framing of energy as a commodity also emerged when discussing the purchase of household generation technologies, smart meters, energy efficient appliances and storage technologies. These technologies were often framed in terms of return on investment and energy bill cost reductions (see Table 4). The view emerged that these purchases required careful cost calculations on behalf of the consumer. Thus the consideration of these technologies appeared to make a commodity framing, and monetary value, of energy salient.

Overall however, viewing energy in monetary terms only, or as a commodity, was not a particularly central frame. In fact, particularly in the Project A groups where we focused people's attention on energy costs, we expected to see more discussions of energy in monetary terms. And while we find that participants did indeed discuss energy prices frequently, this did not lead to automatically valuing energy predominantly in economic terms. To some extent people appeared to resist this framing, which may, in turn, have led to explicit statements of energy as something that cannot be thought of only in monetary terms. Indeed, particularly in the Project A focus groups we find explicit statements of energy as a need (see Table 1 and Table A.3).

We also find clear instances where participants questioned the usefulness of a commodity framing of energy, or thinking about energy purely in monetary terms, in our Project B workshops. For example, when considering the possibility of time-of-use pricing possibly shifting energy use or even reducing energy use, Mike (Birmingham homeowners, Project B) very much questions whether price signals alone will be sufficient: "You've still got to use it in the same way. It's just that it's going to cost you this much here, and it's going to cost you this much here. So, when you're using, you're not thinking about the costs and that's what my family wouldn't be thinking about the cost, they'd just, 'I need it, I'll do it'."

Further to this, some of our participants were aware of and acknowledged that the energy system is privatised in the UK and therefore energy *should* be viewed as a commodity first and foremost. However, participants also strongly questioned the appropriateness of this. As the exchange below between Lukas and Jake (London2, Project A) shows, predominantly considering energy as a commodity is seen as inappropriate in the context of every person being in need of some energy

irrespective of their ability to purchase it. The marketization of energy was therefore perceived to leave the door open to companies (in the form of cartels) taking advantage of this need:

> Lukas: So all these private companies, they are each competing against each other, you'd think that would bring more competitive prices, bring the profit down-
>
> Jake: They don't though, they're a cartel aren't they?
>
> Lukas: That's right, because everybody needs to use energy, right, it's not like 'I'll be the only household, I don't need any energy.' It's a basic human right and you need that to survive and live. It's like these companies, you are forced to buy off them but they suggest that there's not enough competition, maybe the regulator is not doing their job right, maybe they should go audit these companies […]

Throughout the discussions it becomes clear that considering energy as a commodity sits uncomfortably with many of our participants because it may lead to situations in which people's essential needs are not safeguarded. This is likely because a commodity framing of energy focuses attention on monetary value as well as the market provision (and associated profit-making) of energy. In contrast, values associated with a needs or justice lens, such as equity and fairness, are perceived to be sidelined or even absent. This is evident, for example, when Lewis (London1, Project A) voices his concerns: "It doesn't matter about the little man in the corner or the little old lady that might die as long as someone else is getting a bonus further up the line."

Table 4. Energy as a commodity – illustrative quotations

Participant(s)	Quotation
Jack, Abergavenny (Project B)	Yes, I do, to be honest [think energy is cheap]. If you're working out what the cost to run a household for a day with electric, I think that electric is very cheap, considering what we do with it now, we can't do without it, to be honest. It is a cheap commodity now.
Alyssa, Abergavenny (Project B)	I think, it might be what you're saying, if it was dearer it would discourage people from wasting it and only using what they actually need to use rather than leaving things left on. We do take things very much for granted, I think.
Steven, Birmingham tenants (Project B)	There was one night when I was at home watching TV until about 2 o'clock in the morning, all of a sudden I heard a bang, everything went black. I looked outside, and all the street on the other side was blacked out. Eventually they came round, sorted it out, I went back in the house- bang it went again. And it took them half an hour to sort it out. I mean what am I paying money for? These things shouldn't happen. Do you know what I mean?
Amy, Birmingham homeowners (Project B)	Well, I… if I'm buying a new appliance, I will go for the A-rated, you know, so that's saving energy, you know, and it's probably worth it to do that as well, and it tells you how much you'll save a year. In gas or electricity.
Mike Birmingham homeowners (Project B)	We… we had a Smart Meter for gas and electricity. Um, put it in, um, about 12 months ago, and indirectly it has reduced my bills because I am doing what you say; I'm looking at it, I'm thinking switch that light off… switch that, and I've got almost paranoid…

Idris Abergavenny (Project B)	I feel like the cost is a relative factor though, it's just simply like a case of everyone can say that they want to do a difference about energy but if it doesn't affect your bill that much, people can't be bothered, I think. […] if it was a case of I went self-independent and I pay £10 a month instead of paying £100 a month, then that would be a big difference and therefore it would be like something I probably would give the time to. But if it's like 10 and 20 quid, like 30 and 40 quid or something, it's not going to make any difference, is it, if it's a tenner. Yeah, it's fine, I don't need to be independent, there's no point, it's too much time.

4 Discussion

4.1 Participants' conceptualisation of energy as a need

In the context of the multiple socially constructed meanings of energy, we focus here on UK public views of this issue. We propose that a particularly salient and widely shared framing within the elicited public discourse delineates energy as a need and basic right. As our analysis has shown, this way of thinking about energy arises out of considerations for how energy fulfils basic needs for good health (and survival) and living a decent life, which our participants felt should be afforded to every person in the UK. The consideration of energy as a need was particularly evident when participants considered their own and wider society's dependence on energy (often made salient through power cuts), and when they considered the needs of vulnerable groups within society. Of course energy was not exclusively thought of as something that is needed but also something that can be wasted or viewed as a luxury. In general, however, it became evident that most of our participants were primarily concerned with ensuring a basic need for energy was safeguarded and guaranteed in the context of future changes to the energy system, although precisely what constitutes an energy 'need' beyond those that ensure survival and good health was not easily identified. In addition, participants were certainly aware of, and able to engage, with different framings of energy, in particular that of energy as a commodity, a framing, which is consistent with the market-based provision of energy in the UK. Nonetheless, when energy was discussed as a commodity, we also found that this then prompted participants to reconceptualise and refocus attention on energy as something that is, to a degree, a basic need at its core. We therefore find that people echo what has been said in the academic literature especially around energy justice such as the importance of availability and affordability of energy services across society underpinned by the principle that all people are entitled to the basic goods necessary for well-being and ability to participate in society, as well as the importance of respect and recognition for needs of diverse, and especially vulnerable, groups.

Conceptually, we posit that 'energy as a need' is a general framework through which our participants appear to conceptualise energy. This is significant for understanding how people evaluate energy and changes to energy use or systems. Our analysis suggests that independent of where individuals distinguish between energy needs and luxuries, people expect 'some' recognition that energy is a basic need and that these needs ought to be safeguarded, especially in relation to the

affordability of energy. In our workshops, people were highly sceptical of future changes and policies unless they are able to fully take account of how perceived basic energy needs would be met (including potentially high energy use by vulnerable groups). Therefore we stipulate that viewing energy through a 'needs' frame is an intuitive and salient way for people to understand energy use in their own, and others' lives, and provides a framework in which future changes to energy provisions are evaluated.

4.2 Implications for communication and delivery of energy policy

As we stated in the introduction, energy can be framed in different ways, and that different frames service to highlight particular values, problem definitions and solutions in the context of energy transitions. To better understand public engagement and acceptability of energy transitions and associated policies and programmes, we argue that we must first understand the frames that people use. Having found that 'energy as a need' appears to be a particularly salient way people think of energy and its role in society, we now go on to examine what implications this has for the communication and acceptance of energy policy.

One implication of the salience in public discourse around 'energy as a need', might be that people are particularly vigilant about threats to the fulfilment of basic energy needs. For example, access to energy may be denied through high prices and unaffordability. This is certainly confirmed by repeated findings that people are concerned about the affordability of energy. The continued rising of energy prices over the last decade in the UK is likely to have heightened the threat that is perceived from unaffordability, which some participants saw to be the consequence of commodification and marketization of energy. While energy prices are a tangible and direct way that people might judge whether their basic energy needs are under threat, people are also likely to take cues about the safeguarding of energy needs from other sources, for example how policies are designed, delivered and communicated [36]. This way policies also have impacts that are perhaps more subtle and diffuse in terms of public responses and acceptance. The implication then is that if policies and programmes are communicated and delivered in a way that do not align in some way with people's intuitive understanding and experience of energy (as a need), this could lead to disengagement and/or scepticism. In this more general sense, it could be argued that energy policy in the UK is moving further away from a framing of energy as a need and right, and further towards understanding energy solely as a commodity, for example through the continued focus on involving people in the market-based provision of energy, i.e. emphasising the importance of frequent switching between energy providers, or buying and selling energy as part of owning energy production technology. These policies encourage people to act as players in a market in which energy is considered mostly in monetary terms (also see [37]). This way of framing energy as a commodity is somewhat

disconnected from the way in which our participants primarily understood energy; and it often did not sit comfortably for many of them.

'Needs' and 'commodity' framings of energy are of course not mutually exclusive, but they do focus attention on two rather different sets of values and concerns. We posit that our respondents often questioned the appropriateness of a pure commodity framing of energy because commodification can threaten meeting essential needs for energy. As such, the privatisation of energy was often criticised by participants, not because they necessarily object to paying for energy, but rather out of concern that this can lead to a situation where there is no guarantee that people will have enough energy to meet basic needs. As such, commodification of energy may only be acceptable to people if affordability is ensured in some way (i.e. through regulation of energy prices). The discussion suggests that people were sceptical that this was currently done sufficiently especially in the context of increasing energy bills. This is also in line with the analysis of fuel poverty literature discussed in the introduction, which has criticised UK approaches towards ensuring energy needs being rather narrow and inadequate. It could be said that our participants echoed similar concerns such as fuel poverty policies focusing heavily on meeting heating needs only and having very limited ability to distinguish needs of different groups of people, especially those with high energy needs and low incomes [9].

Many of the concerns that our participants raised in relation to energy needs did not only focus on current energy affordability, but also related to future policies and changes to the energy system to ensure low-carbon and reliable energy provision. Accounting for people's differentiated needs and ability to purchase energy is something that our participants wanted evidence of when considering the acceptability of issues such as smart and digitized energy systems, demand-side management (e.g. through time-of-use tariffs), energy storage technologies or various energy saving programmes. As such, these polices, programmes and potential changes were first and foremost evaluated in terms of how it threatens (or safeguards) essential energy needs. This was particularly heightened through the consideration of vulnerable groups. Intuitively, a market-based system in which energy is mostly considered as a commodity will disadvantage vulnerable groups because the market assumes everyone buys as much energy as they want (or how much they are willing to spend on energy) and cannot take into account the differential needs of people independent of their means to purchase that energy. As Lawson et al. (2016) and Middlemis & Gillard (2015) argue, vulnerable consumers are at a particular disadvantage in a market system due to low agency, which in the eyes of our participants may be exacerbated by certain potential future changes, e.g. the need to engage with smart systems or risk buying energy at peak price points [38,39]. In that sense, the 'justice as recognition' issue [16,40] was certainly something our participants were keenly aware of.

We therefore conclude that policies that introduce changes and programmes primarily through market mechanisms, and without strong and clear regulation and guarantees, is unlikely to make people feel that their needs, and those of others, are safeguarded, particularly in the context of energy transitions that imply substantial shifts in how energy is produced, consumed and governed. There are some, albeit limited signs of shifts at more localised scales of governance that are beginning to take into account some of these concerns. Recent research into local authority energy initiatives in the UK has found a broad range of projects from traditional energy efficiency measures to novel electricity generation and district heating schemes targeted at low income communities. With aims ranging from council income generation and carbon saving to reducing fuel poverty, such trends may point towards a more socialised model for energy provision emerging below the surface of national policy discourses framing energy as a commodity [41].

4.3 Limitations and future directions

We have focused on making explicit the importance of understanding public conceptualisations of energy as a need and basic right. However, we did not examine how this frame may have become salient in public discourse as we found it to be in our workshops. Our analysis suggests that this frame may be particularly important in the context of high prices, the marginalization of vulnerable groups in energy policy, and the increased focus on energy in monetary terms. These would provide starting points for further analysis into how the public discourse of energy as a need has been shaped and may evolve in the future.

Furthermore, it will be important to conduct more focused research on what 'energy needs' mean to people, and how people link 'energy needs' with the notion of 'rights'. In the current analysis, mentioning of 'rights' only emerged in any significant form around the discussion of energy 'needs', i.e. use of energy that enabled survival, ensure good health, and a decent life. However it is unclear if, and how far, the idea of 'a right to energy' extends beyond the notion of energy 'needs', for example to include people's freedom to choose how (and when) to use energy. Similarly, it is clear that there are some absolute needs upon which most, if not all, our participants agreed, but naturally there were differences in terms of what constitutes a genuine energy 'need' versus what might be considered a 'luxury'. In particular, people might find it easy to agree upon issues that are considered clear 'needs' (e.g. energy use that is necessary to ensure good health) and clear 'luxuries' (e.g. TVs and entertainment systems in multiple rooms in the same house), but views on the boundaries between these two categories are much more difficult to agree upon (e.g. what energy use is necessary for a 'decent life'?) Indeed, Walker et al. (2016) have begun to examine ways in energy 'needs' may be differentiated from energy 'luxuries' for policy purposes; they also find a large range of views on this matter. How people negotiate what they perceive as necessary energy use can depend strongly on their specific context and personal histories (see [42–44] for diverse perspectives).

There are further aspects in which our analysis is limited, and which provide opportunities for further examination. First, public conceptualisations of energy as a need was a frame which emerged in our participants' discussions in relation to household energy use, but energy use for transport was not often mentioned. This suggests that people in the UK may view energy for transport differently to energy use in the home. Further research is required to clarify this. Second, while we are able to show that 'energy as a need' is a way of anchoring people's understandings and discussions across research contexts, it may be possible that other framings emerge as particularly salient in yet different contexts. For example, it may be of interest to examine people's responses to a discussion where energy provision is explicitly framed as a market. While our findings suggest that this will perhaps even heighten 'energy as a need' in people's mind, this has yet to be examined in depth. Third, the analysis in this paper takes a UK focus, which may limit its applicability in other national context and it is important to carry out similar analyses in other countries. On the one hand, we would expect differences because the way energy provision is governed in different countries can vary widely, therefore potentially leading to differentiated experiences and expectations among the public. On the other hand, to the extent that some level of energy access is essential regardless of context, we would expect energy as a need to be a frame that emerges across countries, albeit in contextually specific ways. For example, while physical access to energy was less explicitly discussed as an issue with energy need fulfilment in the UK (whereas affordability is a more salient issue), this may be a more prominent theme in countries where infrastructures are lacking resulting in uneven access to energy services [17]. Another aspect that might be important is the extent to which energy provision is privatised in a given country [21,45]; our analysis suggests that marketization of energy without strict regulations, especially in the context of rising energy prices, focuses people's conceptualisations of energy as a need.

5 Conclusion

In order to find acceptable and inclusive solutions to current energy challenges such as climate change and energy security, it becomes important to understand how different groups in society understand and conceptualise energy. Focusing on public framings of energy, we find that a particularly salient frame views energy as a need and basic right. This conceptualisation of energy arises from its perceived role in ensuring survival, good health and a decent life. It provides a framework for people's evaluation of proposed changes to the wider energy system including how energy is produced, consumed and governed. We conclude that people expect 'some' recognition that energy is a basic need and that these needs ought to be safeguarded (e.g. through regulation or the design of policies), which in the UK context is called into question in relation to the marketization of energy, rising energy bills and fuel poverty. In addition, our participants questioned whether future changes and policies are able to take into consideration how perceived basic energy needs would be met or at least not jeopardised including potentially high energy use by vulnerable groups.

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Appendices

Table A1. Sample characteristics of the Project A focus groups

Location	**Participants (total)**	**Males/Females**	**Age range**	**Occupations represented (as defined by participants)**
Cardiff	9	4/5	Not available	Not available
London 1	7	5/2	37-64	Unemployed, skilled manual, retired engineer, lawyer, HGV driver, sales promotion, manager
London 2	7	6/1	25-71	Personal assistant, retired, self-employed, local government officer, electronics engineer
Birmingham	6	2/4	40-68	Unemployed, retired, unemployed, retired, teacher
Glasgow	8	5/3	21-72	Museum assistant, bank worker, retired engineer, housekeeper, housewife
TOTAL	**37**	**22/15**	**25-72**	

Table A2. Socio-demographic background of participants in each of the four Project B workshops

Workshop	Total number	Age brackets	Male/ Female	Social grade	Tenure type
Birmingham (suburbs homeowners)	11	30-39=2 40-49=4 50-59=3 60-69=2	5/6	A/B=3 C1=4 C2=3 D/E=1	Mortgage=6 Own outright=5 Private rented=0 Social rented=0
Birmingham (city centre tenants)	12	18-29=3 30-39=3 40-49=3 50-59=2 60-69=1	6/6	A/B=3 C1=3 C2=3 D/E=3	Mortgage=0 Own outright=0 Private rented=6 Social rented=6
Abergavenny	12	18-29=6 30-39=1 40-49=1 50-59=2 60-69=2	5/7	A/B=2 C1=7 C2=4 D/E=0	Mortgage=3 Own outright=7 Private rented=1 Social rented=1
Aberdeen	11	18-29=2 30-39=3 40-49=3 50-59=1 60-69=1 70+=1	5/6	A/B=2 C1=4 C2=3 D/E=2	Mortgage=3 Own outright=4 Private rented=2 Social rented=2
Total	**46**	**18-29=11** **30-39=9** **40-49=8** **50-59=8** **60-69=6** **70+=1**	**21/25**	**A/B=10** **C1=18** **C2=13** **D/E=6**	**Mortgage=12** **Own outright=16** **Private rented=7** **Social rented=9**

Table A3. Energy as a need and basic right – additional quotations.

Participant(s)	Quotation
Energy as a need and basic right – general	
David, Cardiff (Project A)	[Energy is] part of civil society, isn't it? The rule of law and being able to walk down the street without being afraid.
Joanna, London2 (Project A)	I think it should be guaranteed to everybody independently, it's a need that needs to be guaranteed to everybody but whoever got higher income and got more money should pay a higher price, it should be proportioned in the way that people on lower income can have what they need, the energy they need to – not survive but live decently and be able to pay for whatever expenses their life needs to be done.
Emilia, Glasgow (Project A)	If we don't have it we'll all freeze to death! I don't fancy that at all. It's something that every individual needs, it's not something that I just need for my house, it's the whole planet, we need it and therefore it should be very important that we have it and that we have it in the proper way that's not going to harm us, there's low carbon energy sources, more green, so we can all live happily on the planet rather than choke to death or freeze to death.
Energy as a need and basic right – vulnerable groups and individual needs	
Martha, Cardiff (Project A)	Well, Katherine was saying her aunt chooses not to use energy just to save the pennies. But I think we're moving away. We're talking about people who haven't got that choice.
Kevin, Cardiff (Project A)	I think it's important to help vulnerable people. Say, if there's like a single man who couldn't afford to pay heating, then they deserve the help.
Simon, London1 (Project A)	I've seen things, sorry, going back on it. But some people, as I've said, these disadvantaged people. They get into the winter and they're in a dilemma. Do they heat their house or do they eat?
Lukas & Tim, London2 (Project A)	L: Of course- The kind of scheduled black-outs and stuff because we'll need to save energy it's like, it's not – I'm not comfortable with that at all. T: Not comfortable but a lot of countries have them, or unscheduled, don't they? But you still have medical issues as well for people that have equipment at home that they need to use regularly.
Amanda, Birmingham (Project A)	I think we should all be helping each other and recognising that some people are less privileged, not just from an income point of view, I mean my son had cancer which he's hopefully getting over but he had to have his flat heated to such a high temperature because he was permanently freezing cold, now he just had to pay that because he did have a very good job, he can't now work, but he could say he was disadvantaged but his attitude is 'I've got some savings so I'll spend those, I don't expect anyone to help me.' But long-term that's not sustainable because when his savings run out… well we'll help him. But I think we've all got to kind of help one another.
Amy, Birmingham homeowners (Project B)	And I don't work, so I'm like, my central heating's on because it… I should imagine it's [inaudible] that my things are done in the day, because I look after my grandson and my daughter's just had another baby, so I'll be looking after that one, but my heating's on… all my things are mainly in the day; C Beebies [children's TV channel] or, you know… bottles, kettles, so that wouldn't… that wouldn't be practical for me.

Table A4. Power cuts and individual and societal dependence on energy – additional quotations

Participant(s)	Quotation
Emilia, Glasgow (Project A)	I think it [energy in the form of fossil fuels] must be very important because they keep telling you we're running out of all these things here that's mentioned so something has got to take its place or we're not going to survive.
Amy and Abigail and Victoria, Birmingham homeowners (Project B)	Amy: Without the electricity, the majority of things, like my gas central heating wouldn't work. […] Abigail: You do when you have a power cut, you're like panicking, aren't you? It's only sort of like, you know, a couple of hours. The whole world stops, doesn't it? […] Victoria: And, um, I don't know why, um, because my twin sister lives in [place name], and she doesn't ever have them, but it always happened when I was in the shower, which was so frustrating when you've shampoo in your hair.
Lisa, Abergavenny (Project B)	We had to shut all the shops, send everyone home. A load of the shops lost their trade and stuff because obviously they had food in freezers that was now not able to sell, so that kind of thing was bad, but that was a very rare occasion and it was in the middle of Cardiff where everyone was just like 4 o'clock, kids are home from school, people are getting home from work, everyone's on the Internet, everyone's just come home and it just blew everything in the street.
Chloe, Abergavenny (Project B)	I think more and more things are electric, aren't they? I've got an electric cooker now and our shower is just electric, which is all fine, but if the electric goes off, it's a bit of a bugger. Can't cook the dinner.

Table A5. From energy as a need to energy as a luxury – additional quotations

Participant(s)	Quotation
Caroline, Martha, and Katherine, Cardiff (Project A)	C: None of us, I doubt think of switching a light on as a luxury. Where, once upon a time, it was. M: Yeah, these days, switching on a light isn't a luxury, is it? C: My eight-year old kicks off if the controller doesn't work. (Overlapping Conversation). K: But then you know, a hundred and fifty odd years ago people survived without it and they…they're all the product of that. They went to bed earlier, got up earlier, read by candle light (laughs), did their sewing by candle- I suppose you could survive without it really. You'd have to change your lifestyle obviously. (Overlapping Conversation).
Amy, Birmingham homeowners (Project B)	I mean, we know if we turn off lights, like, all these; what a waste of having all these lights on, you know, it says turn off. And even if they are, you know, friendly; we still don't do it. Yeah,
Joanna, London2 (Project A)	Definitely we've got a consuming mind, like we are living so spoilt and we are so used to – don't care about little things that help and help to reduce energy use. But as you say, it's up to a certain limit.
Andrew, Glasgow (Project A)	I think we need to have a back-up capacity, I read things in the paper that in the winter sometimes that's much lower now than it has been in previous years, I think that's to do with cutting out burning coal, that's an easy and reliable way of generating electricity but I think you do need to have something that you can use because people now are completely accustomed to having electricity at the switch of a button, it's not like years gone by when people had – probably in the 1970s and they'd get used to the lights going out at a certain time of the night and they just had to put up with it. People nowadays have no experience of that.